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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,581	09/23/2003	David M. Hoffman	132967CT	2399
26946	7590	04/07/2005	EXAMINER	
JOSEPH S. HEINO, ESQ. 111 E. KILBOURN AVENUE SUITE 1400 MILWAUKEE, WI 53202			ROSENBERGER, FREDERICK F	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/668,581	HOFFMAN, DAVID M.	
	Examiner	Art Unit	
	Frederick F. Rosenberger	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 9-12, 18-21, 24 and 25 is/are rejected.
- 7) ☒ Claim(s) 4-8, 13-17, 22, 23, 26 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>09/23/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to because Figures 1 and 3-6 have not been labeled to show the orientation of the X-Y-Z axes with respect to the invention, such orientation being necessary for the understanding of the metes and bounds of claims 2, 11, and 19. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 9 and 24-25 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

With regards to claim 9, which is dependent upon claims 1, 4, and 7-8, applicant replaces the direct conversion material and electrode recited in the limitations of claim 1 with a scintillator/photodiode array. This is improper dependent form, as limitations of the parent claims cannot be replaced in the dependent claim. The test for a proper dependent claim is whether the dependent claim includes every limitation of the parent claim. The test is not whether the claims differ in scope. A proper dependent claim shall not conceivably be infringed by anything which would not also infringe the basic claim.

With regards to claim 24, which is dependent upon claims 18-23, applicant replaces the silicon substrate recited in the limitations of claim 23 with a high density flex circuit. This is improper dependent form, as limitations of the parent claims cannot be replaced in the dependent claim. The test for a proper dependent claim is whether the dependent claim includes every limitation of the parent claim. The test is not whether the claims differ in scope. A proper dependent claim shall not conceivably be infringed by anything which would not also infringe the basic claim. For the purposes of this Office action, claim 24 has been interpreted to depend upon independent claim 18 to alleviate the improper dependency issue.

With regards to claim 25, which is dependent upon claims 18-24, applicant replaces the silicon substrate, recited in the limitations of claim 23, or the high density flex circuit, recited in the limitations of claim 24, with a multilayer ceramic. This is improper dependent form, as limitations of the parent claims cannot be replaced in the dependent claim. The test for a proper dependent claim is whether the dependent claim includes every limitation of the parent claim. The test is not whether the claims differ in scope. A proper dependent claim shall not conceivably be infringed by anything which would not also infringe the basic claim. For the purposes of this Office action, claim 25 has been interpreted to depend upon independent claim 18 to alleviate the improper dependency issue.

3. Claims 2-6, 8-9, 11-12, 14-15, 17, 19-22, 24-25, and 27 are objected to because of the following informalities:

Claims 2, 11, and 19: In lines 4-5, the positive recitation of "the scintillator/photodiode detector array" lacks proper antecedent basis in the claim and the parent claims.

Claim 3: In line 1, "claims 2" should be "claim 2".

Claim 3: In line 2, the positive recitation of "bottom layer" lacks proper antecedent basis in the claim 3 or the parent claims 1-2, as no bottom layer has been defined. For the purposes of this Office action, bottom layer as referred to in claim 3 is interpreted to be synonymous with the substrate material of claim 1.

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Claim 3: In line 3, the positive recitation of "ASICS chips" lacks proper antecedent basis in claim 3 or the parent claims 1-2, as no ASICS chips have been defined. For the purposes of this Office action, ASICS chips as referred to in claim 3 is interpreted to be synonymous with the signal processing chip of claim 1.

Claims 3, 12, and 20: In line 3, the positive recitation of "scintillator/photodiode array" lacks proper antecedent basis in claim the parent claims.

Claim 4: In lines 3 and 4, the positive recitation of "the substrate" lacks proper antecedent basis in claim 4 and the parent claims 1-3, as only a substrate material has been defined in claim 1. For the purposes of this Office action, substrate as referred to in claim 4 is interpreted to be synonymous with the substrate material of claim 1.

Claims 4 and 22: In line 3, "said end block connector" should be "said end block support" to establish proper antecedent basis. In line 3, "acting a support" should be "acting as a support".

Claims 5, 14 and 21: In lines 1-2, the positive recitation of "the direct conversion material detector module" lacks proper antecedent basis in the claim and the parent claims, as only a low profile detector module has been defined. For the purposes of this Office action, direct conversion material detector module as referred to in claims 5, 14, and 21 is interpreted to be synonymous with the low profile detector module in the appropriate parent claims.

Claims 6 and 15: In line 1, the positive recitation of "the second end" lacks proper antecedent basis in the claim and the parent claims, as the second end has not been

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defined. For the purposes of this Office action, the second end will be interpreted as a second end.

Claim 8: In lines 2-3, the positive recitation of "bottom graphite layers" lacks proper antecedent basis in the claim and the parent claims, as the bottom layer has not been defined. For the purposes of this Office action, bottom layer as referred to in claim 8 is interpreted to be synonymous with the substrate material of claim 1.

Claims 8, 17, and 27: In line 1, the positive recitation of "the second end" lacks proper antecedent basis in the claim and the parent claims. For the purposes of this Office action, the second end will be interpreted as a second end. In lines 2-3, the positive recitation of "the top and bottom graphite layers" lacks proper antecedent basis in the claim and the parent claims, as the material for the top layer has not been previously defined. As such, it is unclear whether applicant intends for this recitation to be a limitation for the materials of the top and bottom layers. For the purposes of this Office action, the top and bottom layer material composition has not been given patentable weight outside of the requirement for X-ray transparency.

Claims 24 and 25: In line 1, the positive recitation of "the substrate material" lacks proper antecedent basis in the claim and the parent claims, as only the substrate has been recited in the parent claim 18. For the purposes of this Office action, the substrate material as referred to in claims 24 and 25 has been interpreted as the substrate as recited in claim 18.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The replacement of the direct conversion material and electrode with a scintillator/photodiode array, as required by the limitations of claim 9, renders the limitations of the parent claim 4 unclear. Specifically, claim 4 calls for an end block support to be interposed between the electrode and the substrate. However, after the removal of the electrode, as required by claim 9, it is unclear as to how the end block support would interact with the remaining structural elements. For the purposes of this Office action, the limitations of claim 4 as applied in claim 9 have been interpreted such that the end block support is interposed between the substrate and the top x-ray transparent layer.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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7. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Jeromin et al. (US Patent # 6,075,248).

Jeromin et al. disclose an X-ray radiation detection panel capable of being used in a CT system comprising:

An X-ray transparent top layer **40** (Figure 3);

An electrode **38** on said top layer **40**;

A block of direct conversion material **34**, with the electrode **38** providing a common bias to the direct conversion material **34** (column 4, lines 14-17);

A substrate material **12** electrically connected with the direct conversion material **34** through conductor **53**;

A signal processing chip, in the form of amplifiers and integrated circuits **52** (Figures 2 and 3; column 4, lines 50-53), electrically connected to the substrate **12** through conductor **53** and contact **54**;

And a connector element, in the form of conductor **53**, connected to the substrate **12** (Figures 2 and 3).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. Claims 2-3, 10-12, 18-21, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeromin et al. (US Patent # 6,075,248).

Jeromin et al. disclose a detector module capable of being used in a hybrid scintillation/direct conversion CT imaging system comprising:

A top X-ray translucent layer **40** (Figure 3) having at least a bottom surface;

A high voltage electrode **38** deposited on the bottom surface of the top X-ray translucent layer **40**;

A bottom layer **50** (Figure 2) having at least a top surface;

A substrate **12** (Figure 3) situated over a portion of the bottom layer **50**;

A block **34** of direct conversion material interposed between and in electrical connection with the electrode **38** and part of the substrate **12**;

And an ASICS chip **52** in electrical connection with the substrate **12** through conductor **53** and contact **54**.

Although Jeromin et al. do not specifically disclose that the substrate is connected to further signal processing hardware, it is well known in the art that after signal acquisition, more extensive signal processing is necessary for noise filtration and detection improvements. Jeromin et al. allow for appropriate signal processing methodologies for use with their device (column 7, lines 8-12), although the relation of the signal processing hardware to the detection device is not mentioned outside of the amplifier integrated circuits **52**. The inclusion of a connection on the substrate to further signal processing hardware would have been an obvious matter of design choice to one

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skilled in the art, as the use of additional signal processing hardware for radiation detection is well known for further detection signal processing and analysis.

With regards to claims 2, 11, and 19, the limitations of these claims do not introduce any additional structural limitations for the low profile CT detector module. Instead, the module is disclosed to have the ability to be translated to various positions within a CT apparatus. Such limitations constitute a manner of operating the detector module. The manner of operating the device does not differentiate apparatus claims from the prior art. See MPEP 2114 -- A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In regards to claim 3, 12, and 20, Jeromin et al. demonstrate a sandwich type construction between the top layer **40** and the bottom layer **50**, wherein the electrode **38**, the direct conversion material **34**, and the substrate **12** are located in between the layers. Although Jeromin et al. place the signal processing hardware external to the sandwich, the location of the signal processing hardware would have been an obvious matter of design choice, since applicant has not disclosed that the location of the signal processing hardware solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the signal processing hardware external to the layer structure, as shown by Jeromin et al.

In regards to claim 21, Jeromin et al. show in Figure 2 that the individual detector modules **10** can be situated adjacent each other in an array. Thus the detector modules are buttable.

In regards to claim 25, Jeromin et al. disclose that the substrate material can be a ceramic material (column 3: 30-34).

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeromin et al., as applied to claim 18 above, and further in view of Von Der Haar (US Patent # 6,667,482).

Jeromin et al. disclose all of the limitations of the parent claim 18, as described above. However, Jeromin et al. are silent with regards to the substrate being a high density flex circuit.

Von Der Haar discloses the use of flexible circuit **7** (Figure 1) as the substrate in a multilayer radiation detector for a CT apparatus. Such a substrate allows the device to obtain a compact flexible structure (column 2, lines 14-17).

Thus, it would have been obvious to a person having ordinary skill in the art to modify Jeromin et al. to use a high density flex circuit for the substrate of the detector module so as to enable a compact flexible structure, as taught by Von Der Haar.

Allowable Subject Matter

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11. Claims 4-8, 13-17, 22-23, and 26-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claim 9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

Claims 4, 13, and 22 are directed towards an X-ray detector module, as defined in claims 1-3, 10-12, and 18-21 respectively, with a block of material between the electrode on the top layer and the substrate which both supports the layer structure and provides a connector from the substrate to further signal processing hardware. The prior art as a whole is silent in this regard, as typically the layer structure is self-supportive and electrical connections can be made via direct connection to the substrate or supports are included between top and bottom layers without electrical connections (see Jeromin et al., Sato et al., Von Der Haar, and Rieppo et al. for specific examples). As there is not suggestion or motivation in the prior art for the construction of the device in this manner, the limitations of claims 4, 13, and 22, constitute a novel and nonobvious improvement over the prior art. As such claims 4, 13, and 22 would be

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allowable. By virtue of their dependency on claims 4, 13, and 22, claims 5-9, 14-17, 23, and 26-27 would also be allowable over the prior art.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Rieppo et al. (US Patent # 5,847,499) discloses an apparatus (Figure 3) for X-ray imaging which includes a direct conversion material **74** sandwiched between a top layer **94** and a substrate **70** with electrical connection **72** to the direct conversion material.

Kingsley et al. (US Patent # 5,179,284) discloses a solid-state radiation imager (Figure) that includes a scintillator **30** and photodiode array **20** on a substrate **15** with multiple layers **34**, **42**, **54**, and **60** on the top of the scintillator, end supports **58** supporting the top layers, and connection **24** to external signal processing hardware.

Sato et al. (US Patent # 6,635,860) discloses a radiation detector (Figure 1) with an X-ray transparent top layer **4** and electrode **2** covering a block of direct conversion material **1**, with readout-circuits **7,8** on a substrate **6**.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday-Friday 7:30 AM - 4:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Frederick F. Rosenberger
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